

CLAIMS

What is claimed is:

1. An optical sensor assembly for tracking movement of  
5 a surface comprising:

a target comprising said surface movably mounted to  
present a varying segment of said surface to a focus  
area; and

- 10 an optical sensor comprising a sensing component,  
said sensing component mounted facing said surface of  
said target at said focus area, wherein said optical  
sensor detects a change in position of said surface.

2. The optical assembly of claim 1 wherein said optical  
15 sensor is positioned substantially beneath said surface.

3. The optical assembly of claim 1 wherein said target  
is cylindrical, said optical sensor is aligned placing  
said focus area perpendicular to a longitudinal axis of  
20 said cylinder and said surface is the circumferential  
surface of said cylinder.

4. The optical assembly of claim 3 wherein said  
cylinder has a diameter greater than approximately 8mm.

- 25 5. The optical assembly of claim 4 wherein said  
cylinder has a diameter between approximately 8mm and  
12mm.

6. The optical assembly of claim 3 wherein said surface tracked by said optical sensor is textured.

7. The optical assembly of claim 1 wherein said surface is adapted to move vertically and the response of said optical sensor is substantially invariant to said vertical motion.

8. The optical assembly of claim 7 wherein said optical sensor is positioned perpendicular to and beneath said surface.

9. The optical assembly of claim 7 further comprising a switch disposed beneath a portion of said surface, wherein said vertical movement of said surface activates said switch.

10. A mouse replacement device comprising said optical assembly of claim 1 and a rollerbar having a left end and a mounting end, wherein said rollerbar is adapted to traverse a left travel distance and an activation distance, and said focus area is located at approximately the sum of two times said left travel distance plus said activation distance from said left end of said roller bar.

11. The mouse replacement device of claim 10 wherein said rollerbar has a first portion having a shiny hard

surface and a second portion having a textured surface,  
said sensing component focused on said second portion.

12. A rollerbar mechanism for use in a cursor  
positioning device incorporating a sensor, said rollerbar  
mechanism comprising:

a horizontal base to support said rollerbar  
mechanism adjacent to a computer keyboard;

an elongated metal rod supported at one end by a  
mount that positions said elongated metal rod;

a sleeve terminated with bearings enclosing and  
resting on said rod, said sleeve rotatable around said  
rod and translatable along said rod, wherein said  
rotation and translation of said sleeve is interpretable  
by said sensor; and

an end cap at an end of said rod distal from said  
mount, said end cap floating on a support.

13. The rollerbar mechanism of claim 12 wherein said  
elongated metal rod is resilient when supported by said  
mount at an upward angle to said horizontal base, wherein  
said elongated metal rod forms a bow between said mount  
and said support.

14. The rollerbar mechanism of claim 13 further  
comprising a switch disposed between said end cap and  
said support, wherein said switch is depressible when  
said rod is flexed.

15. The rollerbar mechanism of claim 12 wherein said elongated rod is made of stainless steel.

16. The rollerbar mechanism of claim 12 wherein said sleeve extends approximately 3/4<sup>th</sup>s of the way along said rod.

17. The rollerbar mechanism of claim 12 wherein said sleeve has a matte surface.

18. The rollerbar mechanism of claim 12 wherein said sleeve has a texturized surface.

19. The rollerbar mechanism of claim 12 wherein a first portion of said sleeve has a hard shiny surface and a second portion of said sleeve has a texturized surface.

20. The rollerbar mechanism of claim 13 further comprising a tension adjusting apparatus disposed adjacent to said mount wherein said elongated rod lies on said tension adjusting apparatus, said tension adjusting apparatus operative to alter said upward angle.

21. The rollerbar mechanism of claim 13 wherein said upward angle ranges between 1/2° and 3°.

22. The rollerbar mechanism of claim 13 wherein said upward angle is 2°.

23. A cursor positioning device implemented with a movable surface monitored by an optical sensor, said cursor positioning device incorporating a keyboard support structure comprising:

a horizontal base to support said cursor replacement device and said keyboard support structure; and

an approximately level horizontal surface for supporting a keyboard, said horizontal surface forming an upper surface of said keyboard support structure and elevated a selected distance above said horizontal base.

24. The cursor positioning device of claim 23 wherein said selected distance is selected to place the level of a keyboard space bar of said keyboard placed on said horizontal surface greater than 2mm above said movable surface.

25. The cursor positioning device of claim 23 wherein said movable surface is a rollerbar.

26. The cursor positioning device of claim 25 wherein said rollerbar sits at a height of approximately 32mm above said horizontal base.

27. A cursor-positioning device having limited horizontal traversal capability adapted to compensate for

reaching a horizontal limit, comprising a compensation mechanism comprising:

a horizontal tracking module to receive horizontal cursor-positioning information and transmit said horizontal cursor-positioning information on a communications link;

a horizontal limit detector activated when said cursor positioning device reaches a limit of horizontal traverse;

a suspension-of-tracking module activated by activation of said horizontal limit detector and adapted to suspend operation of said horizontal tracking module; and

a resumption-of-tracking module adapted to unsuspend said horizontal tracking module after a specified period, wherein during said specified period, said cursor-positioning device may be positioned away from said horizontal limit without affecting a cursor position.

28. The cursor-positioning device of claim 27 wherein operation of said compensation mechanism is optional.

29. A pointing device for use with a keyboard, said pointing device functioning as a computer mouse comprising:

a horizontal base to support said pointing device adjacent to said keyboard;

an enclosure incorporating a plurality of apertures,  
said enclosure mounted across a width of a portion of  
said horizontal base;

5 a rollerbar, capable of rotation and translation,  
mounted within said enclosure, a portion of said  
rollerbar available for manipulation through a first  
aperture of said plurality of apertures;

10 a plurality of function keys disposed proximate to  
said rollerbar in said enclosure, said plurality of  
function keys available for manipulation through a subset  
of said plurality of apertures;

a sensor disposed adjacent to said rollerbar and  
adapted to monitor the rotation and translation of said  
rollerbar; and

15 a connection to a serial communication facility  
carrying information about movement of said rollerbar and  
a state of said plurality of function keys, said  
connection implemented within said enclosure.

20 30. The pointing device of claim 29 further comprising a  
switch mounted in said enclosure proximate to said  
rollerbar, wherein said rollerbar is further adapted to  
be depressible, said switch disposed to be activated when  
said rollerbar is depressed.

25 31. The pointing device of claim 29 wherein said  
rollerbar further comprises:

an inner rod; and

a sleeve disposed around said inner rod to slide freely and rotate about said inner rod, said outer sleeve covering a portion of said inner rod.

5 32. The pointing device of claim 31 wherein said sleeve is sufficiently long to always be in said first aperture.

33. The pointing device of claim 31 wherein said sleeve is formed of a material having a matte finish.

10 34. The pointing device of claim 31 wherein said sensor is an optical sensor focussed on said sleeve at an angle perpendicular to an axis of said rollerbar.

15 35. The pointing device of claim 31 wherein said sensor comprises an image captures device that captures images of said sleeve at set times and determines the motion of said rollerbar by computations based on said images.

20 36. The pointing device of claim 34 wherein said optical sensor is mounted beneath said rollerbar focussed on said sleeve above said optical sensor.

25 37. The pointing device of claim 34 wherein a focus of said optical sensor is midway between a normal height of said sleeve and a maximum depression of said sleeve.

38. The pointing device of claim 34 wherein said optical sensor is mounted on a right-hand side of said enclosure



focused on said sleeve of said rollerbar and is located at approximately a minimum deflection point of said sleeve.

5        39. The pointing device of claim 29 wherein said plurality of function keys comprises three function keys.

10       40. The pointing device of claim 29 wherein a correspondence between said plurality of function keys and mouse buttons is configurable.

41. The pointing device of claim 29 further comprising a scroll wheel disposed among said function keys.

15       42. The pointing device of claim 29 wherein said serial communication facility is a PS/2 bus.

20       43. The pointing device of claim 29 wherein said serial communication facility is a USB connection.

44. The pointing device of claim 41 further comprising a pass-through capability allowing a PS/2 connection to said serial communication facility.

25       45. A mouse replacement device adapted for concurrent connection of a PS/2 positioning device comprising:  
         a primary bi-directional serial connection to a computer using an Intellimouse protocol;

a pass-through module adapted to pass PS/2 equivalents of data on said primary bi-directional serial connection to an output port; and

5 a logic module adapted to OR signals from said mouse replacement device and said output port onto a return channel of said primary bi-directional serial connection.

46. The mouse replacement device of claim 45 further comprising a protocol conversion module disposed between  
10 said primary bi-directional serial connection and said pass-through module.

47. The mouse replacement device of claim 46 wherein  
15 said primary bi-directional serial connection operates on a USB port.

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